



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/765,948	01/29/2004	Azat M. Latypov	1857.2190000/JDE	1856
28393 7590 11/26/2007 STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C. 1100 NEW YORK AVE., N.W. WASHINGTON, DC 20005			EXAMINER RASHID, DAVID	
			ART UNIT 2624	PAPER NUMBER
			MAIL DATE 11/26/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/765,948

Applicant(s)

LATYPOV ET AL.

Examiner

David P. Rashid

Art Unit

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 September 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7, 9-10, 12-15 and 17-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9-10, 12-15, and 17-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 September 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

All of the examiner's suggestions presented herein below have been assumed for examination purposes, unless otherwise noted.

Amendments

1. This office action is responsive to the claim and specification amendment received on 9/20/2007. **Claims 1 – 7, 9 – 10, 12 – 15, and 17 – 21** remain pending; **claims 8, 11, and 16** are cancelled.

Drawings

2. The replacement drawings were received on 9/20/2007 and are acceptable. In response to applicant's drawing amendments and remarks, the previous drawing objections are withdrawn.

Specification

3. In response to applicant's specification amendments and remarks received on 9/20/2007, the previous specification objections are withdrawn.

Claim Objections

4. In response to applicant's claim objections amendments and remarks received on 9/20/2007, the previous claim objections are withdrawn.

Claim Rejections - 35 USC § 112

5. In response to applicant's 35 USC § 112 claim rejection remarks during a telephone interview on 9/20/2007, the previous 35 USC § 112 claim rejection is withdrawn.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. **Claims 4 and 14** recites the limitation "the CCD array" in line 10. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. **Claims 1 – 3, 5 – 7, 9, 12 – 13, 15, 17, and 19 – 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sandstrom (US 6,399,261 B1) in view of Yonekubo et al. (US 6,014,360 A).

Regarding **claim 1**, while Sandstrom discloses a method (Col. 2, lines 27 - 53) comprising:

applying a voltage (Col. 5, lines 12 – 13; Col. 13, lines 30 - 35) having a voltage value (any applied voltage has a "voltage value") to pixels (FIG. 2; FIG. 3; FIG. 4) in a spatial light

modulator (SLM) (FIG. 4; Col. 2, lines 66 – 67; FIG. 6, element 601) to move the pixels (FIG. 4);

reflecting light from the moved pixels (FIG. 4);

passing the reflected light (Col. 12, lines 15 - 17) through an apodized pupil (FIG. 4, elements 402, 404; FIG. 6, elements 608, I_1 , I_2) in an optical system (FIG. 6, element 604);

capturing an image from the light after it passes through the apodized pupil (“CCD camera” in Col. 13, lines 3 - 7);

correlating the image and the voltage value to generate a result signal (“...series of test patterns...” in Col. 13, lines 27 - 31); and

calibrating the pixels using the result signal (Col. 13, lines 20 - 34), Sandstrom does not teach blocking a portion of a zero order lobe of a pixel diffraction pattern at the apodized pupil (though Sandstrom suggests there exists a lobe (whether main or side is not specified) that is blocked from a pixel diffraction pattern at the apodized pupil).

Yonekubo discloses an optical recording medium that teaches blocking a portion of a zero order lobe (FIG. 26, element 39 and FIG. 28, element 43 are the primary lobes that have blocked portions due to the slit) of a pixel diffraction pattern (FIG. 10, element 4a) at the apodized pupil (circular objects in FIG. 26 and FIG. 28)

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the apodized pupil of Sandstrom to include blocking a portion of a zero order lobe of a pixel diffraction pattern as taught by Yonekubo to create “a method of providing means for imparting a phase difference to the laser beam entering the objective lens is also applicable as another method for causing the foregoing optical super-resolution phenomenon.”, Yonekubo,

Col. 3, lines 60 – 64 and “[b]y further shielding part of the main lobe, detrimental noise components mixed in the main lobe can be removed, thereby further improving the quality of a regeneration signal”, Yonekubo, Col. 3, lines 27 – 30.

Regarding **claim 2**, Sandstrom further comprises individually resolving each of the pixels (“...for every corresponding SLM pixel...” in lines 31 - 34) using the apodized pupil (FIG. 4, elements 402, 404; FIG. 6, elements 608, I_1 , I_2).

Regarding **claim 3**, Sandstrom further comprises using a charge coupled device (CCD) to perform the capturing step (“CCD camera” in Col. 13, lines 3 - 7).

Regarding **claim 5**, Sandstrom discloses wherein the image of each of the pixels is captured using more than one cell in the CCD array (It is implicit if not already inherent that the image of each of the pixels is captured using more than one cell in the CCD array.).

Regarding **claim 6**, Sandstrom further comprises:

tilting the pixel (FIG. 2; FIG. 3; FIG. 4) through a plurality of desired angles (Col. 7, lines 36 - 38); and

performing the capturing step for each of the desired angles (those angles desired from the possible “25 levels (plus zero)” to perform the calibration as outlined in Col. 13, lines 20 – 34 are performed).

Regarding **claim 7**, Sandstrom further comprises:

tilting the pixel (FIG. 2; FIG. 3; FIG. 4) through a plurality a set of angles (Col. 7, lines 36 - 38); and

performing the capturing step for each angle in the set of angle (those angles in the set from the possible “25 levels (plus zero)” to perform the calibration as outlined in Col. 13, lines 20 – 34 are performed)

using interpolation to determine a voltage value that moves the pixel to an angle outside the set of angles (“interpolating” in Col. 7, lines 36 - 38).

Regarding **claim 9**, Sandstrom further comprises forming the apodized pupil using one of an annular (FIG. 6, element 608) and a semi-circular pattern

Regarding **claim 12**, claim 1 recites identical features as in claim 12. Thus, references/arguments equivalent to those presented above for claim 1 are equally applicable to claim 12.

Regarding **claim 13**, claim 3 recites identical features as in claim 13. Thus, references/arguments equivalent to those presented above for claim 3 are equally applicable to claim 13.

Regarding **claim 15**, claim 5 recites identical features as in claim 15. Thus, references/arguments equivalent to those presented above for claim 5 are equally applicable to claim 15.

Regarding **claim 17**, claim 9 recites identical features as in claim 17. Thus, references/arguments equivalent to those presented above for claim 9 are equally applicable to claim 17.

Regarding **claim 19**, claim 6 recites identical features as in claim 19. Thus, references/arguments equivalent to those presented above for claim 6 are equally applicable to claim 19.

Regarding **claim 20**, claim 7 recites identical features as in claim 20. Thus, references/arguments equivalent to those presented above for claim 7 are equally applicable to claim 20.

Regarding **claim 21**, Sandstrom further comprises using projection optics of a lithography tool (“The present invention relates to printing of patterns...” in Col. 1, lines 10 - 12) as the optical system (FIG. 6, element 604).

10. **Claims 4 and 14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sandstrom (US 6,399,261 B1) in view of Pedersen (US 6,369,879 B1).

Regarding **claim 4**, while Sandstrom discloses a method (Col. 2, lines 27 - 53) comprising:

applying a voltage (Col. 5, lines 12 – 13; Col. 13, lines 30 - 35) having a voltage value (any applied voltage has a “voltage value”) to pixels (FIG. 2; FIG. 3; FIG. 4) in a spatial light modulator (SLM) (FIG. 4; Col. 2, lines 66 – 67; FIG. 6, element 601) to move the pixels (FIG. 4);

reflecting light from the moved pixels (FIG. 4);

passing the reflected light (Col. 12, lines 15 - 17) through an apodized pupil (FIG. 4, elements 402, 404; FIG. 6, elements 608, I_1 , I_2) in an optical system (FIG. 6, element 604);

capturing an image from the light after it passes through the apodized pupil (“CCD camera” in Col. 13, lines 3 - 7);

correlating the image and the voltage value to generate a result signal (“...series of test patterns...” in Col. 13, lines 27 - 31); and

calibrating the pixels using the result signal (Col. 13, lines 20 - 34), Sandstrom does not teach wherein the image of each of the pixels is captured using one cell in the CCD array.

Pendersen discloses a method for determining the coordinates of an object (FIG. 2) that include wherein the image (FIG. 2, element 16) of each of the pixels ("one to one" in Col. 4, line 59 – Col. 5, line 8) is captured using one cell in the CCD array (FIG. 2, element 26).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the CCD array and image of each of the pixels of Sandstrom to include wherein the image of each of the pixels is captured using one cell in the CCD array as taught by Pendersen so that "each LCD pixel is uniquely identified with a number", Pendersen, Col. 5, lines 9 – 10 and in "detecting at known detector pixel locations the intensity sequence of reflected illumination from the surface of the object whereby the identity and location of the originating illuminated pixel can be determined", Pendersen, Col. 2, lines 59 – 62.

Regarding **claim 14**, claim 4 recites identical features as in claim 14. Thus, references/arguments equivalent to those presented above for claim 4 are equally applicable to claim 14.

11. **Claims 10 and 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sandstrom (US 6,399,261 B1) in view of Yonekubo et al. (US 6,014,360 A) and Evans et al. (US 5,965,330 A).

Regarding **claim 10**, while Sandstrom in view of Yonekubo discloses the method of claim 1, Sandstrom in view of Yonekubo does not teach further comprising forming the apodized

pupil using one of a semi-plane, a shearing grating, and an algorithm derived apodization pattern, such that variations are present in at least one of transmittance and phase.

Evans discloses a method for fabricating annular mask lens having diffraction-reducing edges (FIG. 13) that includes forms an apodized pupil using one of an algorithm derived apodization pattern (Col. 13, lines 33 - 56), such that variations are present in at least one of transmittance (Col. 13, lines 33 - 56) and phase.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the annular apodized pupil of Sandstrom in view of Yonekubo to include forming the annular apodized pupil using an algorithm derived apodization pattern, such that variations are present in at least one of transmittance and phase as taught by Evans because “[t]he improved mask eliminates the “halo effect” associated with conventional annular masks...”, Evans, Col. 2, lines 25 – 30.

Regarding **claim 18**, claim 10 recites identical features as in claim 18. Thus, references/arguments equivalent to those presented above for claim 10 are equally applicable to claim 18.

Response to Arguments

12. Applicant’s arguments filed on 9/20/2007 with respect to **claims 1 and 12** have been respectfully and fully considered, they are not found persuasive.

13. **Summary of Remarks regarding claims 1 and 12:**

Applicants argue claims 1 and 12 now recite features that distinguish over the cited reference (for example, claims 1 and 12 recite "blocking a portion of a zero order lobe of a pixel diffraction pattern at the apodized pupil." There is no discussion of either a pixel diffraction

pattern or zero order lobes, let alone "blocking of a portion of a zero order lobe of a pixel diffraction pattern," as recited in claims 1 and 12 that is taught by Evans. Thus, Evans does not overcome the fundamental deficiencies of Sandstrom (*@ response pages 12 – 13*).

Applicants respectfully assert that neither Sandstrom or Evans teach or suggest blocking of a portion of a zero order lobe of a pixel diffraction pattern at the apodized pupil, as recited in claims 1 and 12. Therefore, Sandstrom and Evans either considered alone or in combination fail to establish a prima facie case of obviousness for independent claims 1 and 12. Accordingly, Applicants respectfully request that the rejections be reconsidered and withdrawn, and that claims 1 and 12, and their dependent claims, be passed to allowance for at least the reasons presented above and further in view of their own distinguishing features (*@ response page 13*).

14. Examiner's Response regarding claims 1 and 12:

Applicant's arguments with respect to claims 1 and 12 have been considered but are moot in view of the new grounds of rejection. Though Sandstrom does not teach blocking a portion of a zero order lobe of a pixel diffraction pattern at the apodized pupil (Sandstrom does however suggest there exists lobe(s) (whether main or side is not specified) that are blocked from a pixel diffraction pattern at the apodized pupil), Yonekubo discloses an optical recording medium that teaches blocking a portion of a zero order lobe (FIG. 26, element 39 and FIG. 28, element 43 are the primary lobes that have blocked portions due to the slit) of a pixel diffraction pattern (FIG. 10, element 4a) at the apodized pupil (circular objects in FIG. 26 and FIG. 28)

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the apodized pupil of Sandstrom to include blocking a portion of a zero order lobe of a pixel diffraction pattern as taught by Yonekubo to create "a method of providing means for

imparting a phase difference to the laser beam entering the objective lens is also applicable as another method for causing the foregoing optical super-resolution phenomenon.”, Yonekubo, Col. 3, lines 60 – 64 and “[b]y further shielding part of the main lobe, detrimental noise components mixed in the main lobe can be removed, thereby further improving the quality of a regeneration signal”, Yonekubo, Col. 3, lines 27 – 30.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: US 6,670,986 B1 (with regard to claims 4 and 14).

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David P. Rashid whose telephone number is (571) 270-1578.

The examiner can normally be reached Monday - Friday 8:30 - 17:00 ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would


Application/Control Number:
10/765,948
Art Unit: 2624

Page 12

like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David P. Rashid/
Examiner, Art Unit 2624

David P Rashid
Examiner
Art Unit 2624



VIKRAM BALI
PRIMARY EXAMINER